

Duke in Denmark 2022 KEY

Exercise #2: Natural History Museum (Statens Naturhistoriske Museum) – Face your Past: Neanderthal

We are very fortunate to have a temporary exhibit on Neanderthals in Copenhagen at the moment. Today's exercise will therefore bring you face to face (quite literally as you will see) with the other human species that we shared the planet with until Neanderthals went extinct. Although differentiated as *Homo sapiens* and *Homo neanderthalensis*, suggesting two completely different species, we know Neanderthals and humans successfully interbred. On average, you share between 1-4% of their DNA. My recent DNA test notified me that I have a statistically significant higher percentage of Neanderthal DNA than the average human being (without explaining that statement further). Ok, that will be on the next exam.

Now to the exhibit....

1) When did the Neanderthals go extinct?

Between 30-40,000 year ago

2) What is the biological definition of a species? (you might have to look this up...)

Members of the same biological species are able to successfully have reproduce living offspring, which in turn can reproduce to produce another generation.

3) What was the last interglacial called (the one before the current one we are in) and when was it?

The Eemian

4) How does the maximum global temperature of that interglacial compare to temperatures we see today?

It was probably slightly warmer (WUAT!!!??? Really???, oops there goes all the hype about global warming today)

5) At the beginning of the exhibit, they depict the sights and sounds of a hunt – what is being hunted?

Straight-tusked elephants (*Palaeoloxodon*)

6) How long were Neanderthals on Earth?

Probably around 350,000 years

7) What natural landscape features did Neanderthals use to their advantage in their hunts?

ponds, bogs, also but not mentioned, cliffs and probably steep valley cul-de-sacs

8) What was the primary weapon used to hunt by Neanderthals?

Throwing spear

9) What was notably absent from the throwing weapons we have found associated with Neanderthal sites?

None of these spears have stone implements attached to them

10) What actual concrete evidence do we have that suggests the animal in question #5 was hunted by Neanderthals?

It's remains were found together with stone implements within its skeleton

11) Hunting without projectile weapons is difficult and extremely dangerous. Take in the scene depicted and described here. What tactics did Neanderthals use to assure a successful hunt?

Group hunting, ambush, strategic chase, went for the sick and old

12) Are there known "Neanderthal" sites from Denmark?

There are no unequivocally unidentifiable Neanderthal sites in Denmark

13) What was the last Ice Age, that is "glacial", in Europe called?

The Weichsel or Weichselian, in the Alps it is known as the Würm (this is the Wisconsin in N.A)

14) What was the Ice Age that occurred prior to that called?

The Saalian (this is the Illinoian in N.A.)

15) Which of these Ice Ages experienced the greatest ice sheet extent (you might have to look at the nifty map on the wall).

The Saalian

16) What did Neanderthals use pitch for (although probably not for their spears)?

Birch bark

17) Make a list of a typical Neanderthal menu

Berries, fruits, fungi, nuts, and meat (in popular depictions Neanders only eat meat).

18) Like their human neighbors, what nutrient-rich "delicacy" was on the Neanderthal menu that rarely shows up on modern menus today?

Bone marrow (I read a paper somewhere that argues that humans would have never successfully made it through Ice Age swings without this highly nutritious resource)

19) How can archeologists be sure that the animal bones they find alongside Neanderthal remains were not just randomly washed together, or represent times of cohabitation? Indeed, how do they know that these animals were butchered and eaten?

These bones are "butcher" and "cut marks" on them. Indeed, these are so distinct, we can recreate exactly the steps that Neanderthals took to butcher different animals.

20) How is cooking food (both meat and plants) advantageous?

It dramatically increases the body's ability to ingest and absorb many of the nutrients.

21) Like their human neighbors, Neanderthals used wood and _____ on their fires.

bone

22) We suspect that Neanderthals could make their own fire (rather than just collect it from lightening or natural fires). What natural ingredients might they have used to start a fire?

Gotta love this! Hand axe, pyrite lumps, and manganese nodules for sparks, bulrush (cattails) and tinder mushroom (yes you read that right!) for tinder.

23) What objects, found at various Neanderthal sites, suggests that they had a sense of aesthetics and beauty? (Ok, this is so cool!)

Sparkly crystals, beautiful rocks and shells. I totally get it.

24) What natural coloring agent is often found at Neanderthal sites?

Ochre, derived from red clay

25) When were the first Neanderthal remains discovered in the little “Feldhofer Grotto” in Germany?

1856 – the timing couldn’t have been better since Darwin was to release *The Origin of Species* in 1859.

26) What was the sex and age of the first Neanderthal skeleton found?

Male, probably between 50-60 years old (so they didn’t die THAT young).

27) What evidence suggests that Neanderthals probably cared for their sick and dying?

Healed bone scars

28) What controversy surrounds the idea of “Neanderthal Burials”?

Whether Neanderthals were buried out of love or out of necessity. No unequivocal evidence of actual grave gifts or purposeful placement?

29) What did Neanderthals use to make “glue or pitch”? How do you think might Neanderthals have discovered how to do this?

Birch bark. They might have noticed this resin forming on birches partially burned by natural forest fires

30) How were the tips of throwing spears hardened?

Drying them over a fire

32) The method of making multiple tools from one stone core is called _____ (this is the Neanderthal’s version of the Swiss Army knife!)

The Levallois Technique

33) What is the Neanderthals rock of choice?

Chert (flint)

34) Although stone implements are not found attached to bone or wood handles, how do we know that pitch was used for these purposes?

Microscopic residues of pitch are found on the base of stone implements

Let’s go on into the next room

35) What environmental change took place in Europe around 80,000 years ago?

The Ice Age tightens its grip and forests vanish and are replaced by tundra

36) What is wrong with our popular mental association of Neanderthals and the frozen tundra of the Ice Age?

Not all Neanderthals lived in cold places all the time.

37) Marvel at the “cute” landscape reconstruction (poor Mammoth...). How do we reconstruct what plants were present during this time?

From pollen, spore, and plants fossils preserved in bogs and soils

38) What is nearly 10,000 km long and 2,000 km wide at this time?

The so called Mammoth step a belt of ice age tundra that circumvents the Northern Hemisphere

39) How tall did mammoths get (at the shoulder)?

3 meters (that's 10 feet!)

40) What characteristic feature did mammoth sport on their head (which by the way, readily distinguish them from mastodon)?

The "lump"

41) When did mammoths go extinct?

That depends where you are, the last true mammoth died out on Wrangel Island around 3700 years ago (that age is a little younger than the 4200 years I learned, not sure if there is new science I am unaware of). Mammoth died out everywhere else around 10,500 years ago.

Take a look at the mammoth skull. Imagine you are "pre-scientific" person who has never seen an elephant before. Based on the skull, how many eyes would you have said this "monster" must have had? This is where Greek legends started.....

42) Why is the Cave Bear called, well, Cave Bear? Does this mean it spent its life in caves? LOL

Because its skeleton is always found in caves. Just like modern bears, it probably used these for hibernation and as temporary dens. Just as modern bears often do, they probably died in them during harsh winters....it would be a little like calling people "coffin humans" because we always find their dead in, well, coffins....

43) When did cave bears live?

130,000 to 24,000 years ago

44) What happens to the morphology of cave bears throughout the last glacial period?

They are getting more massive, a general trend in cold-climate animals, as this reduces their surface to volume ratio and enables them to hold on to more heat.

44) Perhaps surprisingly (since they seem to have a rather nasty disposition in popular culture), what was the primary diet of cave bears? (this is reflected in their teeth, the surfaces of which look much like....yours!).

They were omnivores, their teeth are cusped (rather than grooved, sharp, or pointy), just like ours...

45) Ugh, what's that large bone between the bear's hindlegs (see, you also learned something new and interesting about bears today)....

THAT is a penis bone. Yes. Of course they are pretty common in mammals, even in cats and dogs. You rarely see them reconstructed as part of the skeleton though.

46) What two types of hair (fur) did wooly mammoths and wooly rhinoceros have?

A coarse outer fur and a shorter underfur

47) How else are these members of the "megafauna" adapted to life in the cold?

They are LARGE (see surface to volume ratio in question 44)

48) Take a look at the surfaces of the mammoth's molars? Are these adapted to chopping, slicing, or grinding?

Grinding. Mammoths were grazers like cows and horses. Mastodons were browsers, they have high cusps on their teeth. You are what you eat.

49) Besides rhino and woolies, what other animals roamed these Ice Age steppes (tundra)?

Brown bears, Irish Elks, reindeer, steppe bison, saiga antelopes, musk oxen, and horses (I like how they call them “wild” horses, LOL) and presumably cave bears when they bothered to come out of their caves....LOL

50) We actually have a very good idea of what the diet of the Ice Age herbivores consisted of. How?

We have DNA and fossil plants preserved from dung and coprolites. Remember many of these animals have actually been found mummified in Siberian permafrost with their soft-tissue intact!

51) Mammoths are often shown reconstructed with reddish-brown hair. Why is this probably inaccurate? What was the more likely color (!)?

Ok, so this is interesting. The reddish, brown color is most likely the result of the tannins in the permafrost bog and soils from which these samples come. They probably were more light brown and even “blond” in appearance.

52) The exhibit lists two drivers behind the extinction of the mammoths, they are.....

Global warming (climate change) and overhunting

Let's go take a look at the naked dude in the next room...

53) Remind yourself again, what evidence do we have that Neanderthals and Humans interbred?

We share their DNA (also there are several archeological sites where implements co-occur, perhaps overlap even....

54) How long did Neanderthals and Humans share the Eurasian region with each other?

The overlapped at least 30,000 years

55) By which “land route” did the African ancestors of humans arrive in Europe between 45,000 and 60,000 years ago?

The Levant, basically the Sinai peninsula and what we call the Middle Eastern Mediterranean countries today.

56) Speculations about why Neanderthals died out are as numerous as there are people who love them. The exhibit mentions a “measurable” index that would have contributed to their demise by the time modern humans arrived. What was it?

They had very small population numbers, this would have led to inbreeding and low birth rates.

57) How are Ice Age hyenas and Neanderthals rivals?

They hunt the same animals

58) What significant discovery was made in the Denisovan Cave in Siberia?

A third “human” species that shared the planet with the Neanderthals and Homo sapiens, currently described as the Denisovans. The exact evolutionary position of the Denisovans remains heavily debated (I think).

Now take a moment and watch the rather cleverly designed audio/visual show (the headsets provide English translations). Take a moment to reflect. This is more than just learning about some extinct species. It is about looking in the mirror. How would modern society treat Neanderthals today?